

TOTAL PHENOLIC CONTENT IN CANNED BEANS

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Introduction

Phenolic compounds in beans have been studied primarily because they reduce mineral and protein absorption and because of their potential role in the "hard-to-cook" phenomenon. However, current research suggests that plant phenolics may reduce the incidence of disease (1). Bean extracts have been shown to have antimutagenic (2,3) and antioxidant activities (4,5). Two animal studies show that feeding beans inhibits cancer (6,7). Epidemiological studies show an inverse relationship between the consumption of legumes and the incidence of chronic diseases such as cardiovascular disease, cancer, diabetes, and other degenerative disorders (reviewed in 8). Therefore, in societies that suffer from chronic diseases and seldom have mineral or protein deficiencies, bean phenolics likely promote good health. However, identification of protective components in beans and their mode of action are just beginning to be investigated. Takeoka et al (9) identified three anthocyanin glucosides in black beans and Beninger and Hosfield (5,10) identified anthocyanins, flavonol glycosides, and proanthocyanidins (condensed tannin) in seed coats of several bean varieties. Work to date has focused on raw beans or isolated seed coats rather than cooked or canned beans. Herein we report the total phenolic content of beans as they would be consumed. Since some consumers discard the brine from canned beans, we determined total phenolics in the brine, beans, and beans plus brine.

Materials and Methods

Commercially canned beans were kindly provided by Bush Brothers and Company. Three fractions were prepared for each type of bean: a) the entire contents of a can, b) the brine, and c) the beans. The water content for each fraction was estimated from published data and sufficient methanol and concentrated HCl was added to yield a mixture of 70% methanol: 29% water: 1% HCl. The beans and/or brine were homogenized in the methanol:HCl mixture and then sonicated for 1 hr. The sonicated homogenate was placed in a refrigerator overnight and then centrifuged. The supernatants were condensed under vacuum and low heat (45 °C). The condensed extracts were assayed for total phenolic content by the Folin-Ciocalteu assay and the results are expressed as (+)-catechin equivalents.

Results and Discussion

Table 1 shows that a wide range in total phenolics exists in canned beans (56 to 223 mg of (+)-catechin equivalents). The quantity of phenolics that leached from the bean into the brine ranged from 17 to 47 mg of (+)-catechin equivalents. The quantity of phenolics migrating from the beans into the brine was fairly consistent with the exception that only a small quantity of phenolics was in the brine from pinto beans. More than half of the phenolics were in the brine of baby butter, large butter, and garbanzo beans. If bean phenolics are shown to promote health, then a significant portion of the potential health benefits are lost when the brine from these varieties is discarded.

Conclusions

There is a wide range in phenolic content of canned beans and more than 50% of the phenolics originally in beans are leached into the brine of bean varieties that possess smaller quantities of phenolics.

Table 1. Total phenolics in canned beans (mg of (+)-catechin equivalents per can).

	<u>Brine</u>	<u>Beans</u>	<u>Beans + Brine</u>
Baby Butter	37	25	56
Large Butter	34	30	64
Navy	28	43	66
Purple Hull	34	43	77
Garbanzos	45	37	76
Black eyed peas	33	60	86
Pinto	17	83	100
Crowder	34	68	98
Red	23	92	124
Light Red Kidney	43	79	149
Dark Red Kidney	38	88	159
Black	47	175	223
Average \pm SD	34 \pm 9	64 \pm 41	107 \pm 49

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